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ABSTRACT

During the past 100 years, technological development in the Republic of China has not been able to catch up with that of western industrialized countries. An important reason is that early Chinese society despised technology and failed to include technical education in orthodox, mainstream education. The concept that one's advancement is in proportion to and based on one's academic achievement affects the content and direction of education even now. Since it has moved to Taiwan from the mainland, the government of the Republic of China has devoted large amounts of money, personnel, and materials to the development of technological and vocational education. The rapid growth of the Taiwan economy is honored as the Taiwan experience and as a model for developing countries. Although the content and teaching methods of trade training have produced many skilled specialists, scholars and educational administrators are now afraid that students receiving only trade training may not have a strong background in mathematics, physics, or chemistry and may not be able to adapt to the new challenges and rapid change in a scientific and technological society. The concepts of cluster programs, career education, lifelong education, and competency-based education are gradually being imported. (13 endnotes) (YLB)

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A STUDY OF TECHNOLOGICAL AND VOCATIONAL EDUCATION IN THE REPUBLIC OF CHINA: SOME CONCEPTS AND THEIR IMPLEMENTATION

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A Study of Technological and Vocational Education in the Republic of China: Some Concepts and Their Implementation

I. Introduction

Chinese culture has a distant source, a long history and has been passed on from one generation to another with the rise and fall of various dynasties. Surveying ancient China, it is evident that the trend of the development of techniques and skills and how they were instructed were closely related to social values and beliefs.[1] In ancient China, its bureaucracy and the concept of the primary of a unified political system, both derived from Chinese traditional culture, deep-rooted in Chinese society, had not only led to the supremacy of politics in determining and directing everything but also produced a profound effect on social values and beliefs. Ancient Chinese society disregarded techniques. They were viewed as insignificant, strange, tricky, skills of no high order, not in good taste and totally unfitted for a gentleman. Moreover, technicians in ancient China might even be put to death as a result of their pursuit of tricky crafts. As indicated by a regulation coming from Chou-li (the Rites of Chou) that "If one confuses and cheats people by means of strange equipment and tricky crafts, he shall be put to death." During the Han dynasty Confucianism predominated while Moism with its advocacy of hard work and its emphasis on the importance of techniques and practice was ignored.[2] This exerted an enormous effect on the

concepts and trend of early technological and vocational education in ancient China. There were many reasons why during the past 100 years our technological development has not been able to catch up with that of western industrialized countries. Among them the most important reason is that early Chinese society despised techniques and failed to include technical education in orthodox, mainstream education. This contempt of skills proved to be unwise and worked to our country's disadvantage. In contrast, in western societies, skills and techniques have been incorporated into necessities of life and regarded as part of moral life. Based on the research of Charles A Bennett, An expert in technical/ vocational education, the Hebrews had produced many maxims exerting far-reaching influence on technological civilization. For example, "He who does not have his son taught a trade prepares him to be a robber." "He who applies himself to study alone is like him who has no God." "Great is the dignity of labor; it honors man." "He who lives on the toil of his hands is greater than he who indulges in idle piety." [3] Through the ages, the concepts that one serves the emperor or government if he excels in scholarship and that studying books (good learning) leads to wealth and power have induced countless Chinese youths to immerse themselves in studying books day in and day out. Even now the concept that one's advancement is in proportion to and based on his academic achievement is still affecting the content and direction of our education and instruction. This academocracy, together with a common belief in degrees and diplomas as means and indicators of success, leads to many deviations in our education. These deviations need to be amended, corrected and

compensated by means of developing technological and vocational education. Owing to this recognition, the government of the Republic of China has spent a large amount of money, man power and materials in developing technological and vocational education during these years and has achieved significant results. The rapid growth of Taiwan economy is honored as "Taiwan experience" and as a model for developing countries to follow. The foundation of Taiwan's rapid growth in economy is based on its bountiful technical manpower and is closely related to the developing of technological and vocational education. As a result of job orientation and income orientation, social values in Taiwan society have gradually changed from contempt of techniques to current emphasis on skills and respect for technology. This transformation has provided a plentiful, fertile environment for future advanced technology and science to take root and bear fruit. Thus it is believed that the rapid growth and full development of technologoical and vocational educaion in Taiwan are in sight.

II. Technological Civilization in Ancient China

1. Contributions of Ancient Chinese Technological Civilization to Human Life

Prior to the western industrial revolution, Chinese technology led the world for almost two thousand years. In addition to the well-known four great inventions (compass, paper, printing, gunpowder), there was Ho-feng ti-tung yi (seismographic apparatus capable of recording the

direction of earthquakes constructed by Chang Heng during the Hang dynasty), the first seismograph in the world. Furthermore, Chinese silk technology, ceramic technology, metallurgy and alchemy had made a great contribution to the emerging of modern chemistry. According to Joseph Needham, an English scholar, Europe acquired from China so many techniques from the first century to the fifteenth century that China's contributions to Europe are perhaps as significant as the technology and science transmitted by western missionaries to China.[4] In a word, Ancient Chinese technology once enriched the technological history of human beings and made a great contribution to the welfare of mankind and human life.

2. The (Negative) Influence on the Development of Technology by Social Values and Beliefs in Ancient Chinese Society

The Chinese concepts that one who works with one's mind or brain governs while one who labors physically is governed, that what is above form (the abstract) is called Tao whereas what is within form (the concrete, the touchable) is called tool, that one serves the emperor if he excels in scholarship, and that techniques are of low rank, tricky, strange, insignificant and unsuitable for gentlemen--all these are derived from the bureaucracy and the supremacy of politics in Ancient China.[5] And all these concepts of negating techniques and despising skills were deep-seated in all walks of life in ancient Chinese society. The civil service recruitment examinations directed and decided the subjects for study and their scope. As a result, the scope of knowledge grew narrower and narrower and more and more

self-limited. During the declining years of the Ming dynasty , the scope and contents of the civil service examinations were limited to the Four Books, and the standard answers were based on the collection edited and annotated by Chu Hsi.[6] Mathematics was once among the subjects for civil service recruitment, but now it was discarded. All these were the inevitable consequences of traditional social values and concepts in Ancient China.[7]

3. Characteristics of the Developing Process of Ancient Chinese Technology

The social values and beliefs of ancient Chinese society were disadvantageous to the development of technology. However, on account of the concept of studying thoroughly and pursuing to the very source of a learning and the emergence of new talent for each generation , Chinese technology has been successfully handed down from generation to generation. The characteristics of the transmitting of techniques in ancient China were as follows: unorthodox--neither considered important nor encouraged by the government;[8] lineal--the father passing his techniques on to the son, the son passing the techniques on to the grandson, and the teacher passing his skills on to his disciple; uncontinuous--many techniques being listed as family secrets and only passed on to the son, never the daughter, with the result that many techniques were lost;[9] inconsistent due to the conflict between the government's need to preserve techniques and its fear of the spread of techniques among the masses--some techniques and knowledge such as astrology, surveying, irrigation works, weaponry and transportaion allowed to be studied only within the imperial court but forbidden to

be instructed outside the court with the result that in many respects what was learned within the court differed from what was spread among the masses in content.[10]

III. The Importing of Western Technological Civilization into China

1. Western Technological Civilization Transmitted into China by Missionaries

Matteo Ricci was probably the first missionary who came to China. He, together with some other Jesuits, not only preached Christianity but also provided Chinese students with courses in mathematics, astronomy, irrigation works and agricultural techniques. His chief Chinese disciple Hsu Kuang-ch'i, a scientist and statesman during the declining years of the Ming dynasty, wrote Nung-cheng ch'uan-shu, the most complete agricultural book in China at that time, and produced a Chinese book on both western techniques relating to irrigation works and Euclid's geometric principles.[11]

2. Conflict and Controversy Caused by the Importing of Western Technological Civilization

The importing of western technological civilization into China resulted in considerable controversy among the Chinese. The conservative claimed that European technology was a legacy of China and established their own faction to strengthen their forces. The progressive promulgated a self-strengthening campaign, dealing with foreign affairs. Those who tried to harmonize these two conflicting

forces and beliefs maintained the concept of Chinese traditional culture as essence and western technology as means.[12] Consequently, this desire for maintaining Chinese traditional culture grew stronger and stronger until it became an obsession besetting every Chinese's mind. Eventually this obsession, this complex led to the closing of the whole country to international communication and the breaking out of the Opium War. Defeated in this war, China was not only forced to open five of its ports to foreign trade, but its confidence in and illusion of being the central poltical stage of the world and being a dominating country were shattered to pieces.

3. The Emerging of Technological and Vocational Education for the Purpose of Saving China

In order to defend against western firearms and gunboats, to save China from subjugation and ensure the survival of the Chinese people, the Ch'ing government established the Foochow Navy Yard's ship affairs school (the first western-type vocational school in China) in 1866 (the twenty-second year during the reign of Tao-Kuang Emperor).[13] The following year, the Shanghai Navy Yard's machinery school was also set up. It was at that time that the foundation of Chinese technological and vocational education in its embryonic stage was established.

4. The Establishment of a National Educational System

In 1902, During the reign of the Kuang-hsu Emperor, Ch'in-ting hsueh-t'ang chang-ch'eng (regulations sanctioned by the emperor) was promulgated, also called Jen-yen School System. In 1903, Tsou-ting

hsueh-t'ang chang-ch'eng (school regulations authorized by the same emperor) was announced publicly, also called Kuei-mao School System. As indicated in these regulations, Chinese technological and vocational education had already had definite content at that time and a national technological and vocational educational system was gradually being established: based on these regulations sanctioned by the emperor, industrial schools were divided into three types (elementary, middle, and higher) and the years of study for each level were also stated clearly.

IV. The Development of Technological and Vocational Education in the Repulblic of China

1. Technological and Vocational Education in the Beginning of the Republic of China

In 1913, the Ministry of Education enacted Shih-yeh hsueh-hsiao ling (Regulations for Industrial Schools). Based on the regulations, the term "industrial hsueh-tang" was changed into "industrial school," and industrial shools were divided into two kinds: A (senior) and B (junior), with the purpose of teaching essential knowledge and skills concerning agriculture, industry or commerce. Also, the Ministry of Education decreeded Shih-yeh hsueh-hsiao kuei-ch'eng (Rules for Industrial Schools), which stipulated that vocational schools for girls should be established and the specific situation and characteristics of each region should be taken into consideration in handling the education of women. It was at that time that the term

"vocational school" first appeared in law.

2. Technological and Vocational Education after the Founding of the National Government

In 1928, the First National Educational Conference was held, in which the resolution regarding the educational system of the Republic of China was passed and became effective. After that, various school laws were promulgated one after another. The Ministry of Education decreed Chuan-k'o hsueh-hsiao tsu-chih fa (Organization Laws for Junior Colleges) in 1929; Chuan-k'o hsueh-hsiao kuei-ch'eng (Rules for Junior Colleges) in 1930, which stipulated that junior colleges should be divided into four categories: A, B, C, and D; Chih-yeh hsueh-hsiao fa (Laws for Vocational Schools) and Chih-yeh hsueh-hsiao kuei-ch'eng (Rules for Vocational Schools) in 1932; Hsiu-ting chih-yeh hsueh-hsiao kuei-ch'eng (Amending Rules for Vocational Schools) in 1935, comprehensive in contents and deserving to serve as an index and guide in developing and implementing technical/vocational education. During the Sino-Japanese War, regualtions concerning vocational educaion continued to be amended and revised. For example, in 1948, the Government decreed Chuan-k'o hsueh-hsiao fa (Laws for Junior colleges) and abolished Chuan-k'o hsueh-hsiao tsu-chih fa (Organization Laws for Junior Colleges) at the same time.

3. Technological and Vocational Education after the National Government Moved to Taiwan

The government, after retreating to Taiwan from the mainland, has

been making every effort to strengthen the country. Education has been one of its major concerns and a lot of effort has been put into it. In 1953, the Ministry of Education organized an industrial education delegation to inspect the industrial schools and industrial colleges in Taiwan. After this comprehensive survey and inspection, the Ministry of Education decided to adopt the unit-trade training used in American industrial vocational schools for the purpose of educating students to be technical personnel. In 1955, eight industrial vocational schools were selected for the implementation of the unit-trade training. These vocational schools with equipment supplied by the U.S.A. government provided unit-trade training departments for the purpose of conducting a specialist training and furnishing students with specialist skills and knowledge. Since then, technological and vocational education in Taiwan has shown bright future prospects and become very flourishing and vigorous.

In 1969, Taiwan's technological and vocational education marched into a new stage. The Ministry of Education gradually adjusted the ratio between general high school students and vocational school students from 6:4 to 4:6 and in the long run to 3:7 in favor of vocational school students in 1981. At present owing to a change in objective circumstances and conditions, the Ministry of Education intends to adjust the ratio back to 4:6 in favor of vocational school students. In order to make the technological and vocational educational system consistent, and to let vocational school graduates have more channels and opportunities to pursue education further, the National Taiwan Institute of Technology was established in 1974 and

the Industrial Education Graduate School in National Normal University was set up in 1976. Furthermore, with a view to updating teaching facilities to meet the demands of technological development, the govenment implemented "Plans to Progress Technological and Vocational Education in Taiwan: Stage One," subsidizing technical/ vocational schools with large amounts of funds to assist them in replacing old facilities with new ones. As a consequence, significant positive results were achieved. After executing this project, the Ministry of Education went on to carry out "Plans to Progress Technological and Vocational Education in Taiwan: Stage Two" and "Plans to Progress Technologicl and Vocational Education in Taiwan: Stage Three" and consequently achieved great accomplishment in elevating and improving the quality of teaching faculty and teaching software.

The Sixth National Educational Conference, moreover, passed the resolution concerning twelve-year public education based on vocational education. In addition, in 1988, the government proposed the agenda regarding the extending of public free education to 12 years admitting those willing to pursue education further and suggested abolishing three-year college programs as well as elevating three-year colleges to four-year colleges. These measures are now being carried out actively and are bound to accelerate the development of technological/vocational education in Taiwan and increase the opportunity of vocational school graduates to pursue further studies and relieve the pressure coming from the keen competition of joint entrance examinations.

4. The Development of Theories of Technological and Vocational Education

The contents and teaching methods of unit-trade training had indeed produced many skilled specialists. However, as a result of the rapid development of technology and the emergence of the age of information and data, some scholars and educational administrators are afraid that students receiving only the unit-trade training may not have strong background in mathematics, physics or chemistry and may not be able to adapt themselves to the new challenges and rapid change in a scientific and technological society and meet its demands due to the fact that they attend numerous courses focusing on fieldwork and practice but not many courses concerning the theories of mathematics, physics and chemistry. Therefore, these scholars and educationalists maintain that more courses in mathematics, physics and chemistry should be provided to meet the needs of society. Based on this conception and as a consequence of the emerging of new international technological and vocational concepts with full force, concepts of and courses in cluster programs, career education, life-long education and competence basis education have been imported into Taiwan gradually. As a matter of fact, courses and curricula should be adjusted opportunely according to the factors of time, place, people and job reguirements instead of rigidly adhering to terms or regionalism and limiting ourselves in order that the most positive and fruitful results can be achieved.

V. Conclusion

The educational concept of "educating all, discriminating none" advocated by Confucius; the ideological trend that "a moral man in forming his character, forms the character of others; in enlightening himself, he enlightens others"; the positive work attitude that amassing thousands of dollars is inferior to having specialized knowledge or specialist skills; the more recent concept that work is holy and one should devote oneself to serving one's country by means of specialist skills. All these indicate the positive aspect of the evolution of Chinese technological and vocational educational concepts and the significant progress from the rejection of techniques and skills in Ancient China through the more recent acceptance of them to the present emphasis on them.

Only when educational concepts are valid and deep-seated can educational practices and applications be lasting and permanent. Technological and vocational education is an education that teaches people how to catch fish. Giving people a fish is much less significant than teaching them how to weave nets and catch fish themeslves. A fish can only prevent one from hunger for one day, but providing him with methods of catching fish can benefit him without limit all his life. Today we should not only teach people how to catch fish but we should also teach them not to destroy ecological environment nor to catch fish not yet grown up excessively.

The contents of technological and vocational education should adjust opportunely in accordance with technological development. Those

who have no ability nor eagerness to learn new knowledge are referred to as modern and future illiterates. The society of internationalization, liberalization and diversification has arrived. And the technological and vocational education of the Republic of China is now adapting itself to this new society, to this new trend and making every effort to meet the needs of youth and society. The amendment of regulations, the review of various programs , the mapping out and drawing up of course objectives and the revision of the course outline--all these are vigorously being implemented and fully participated in by special case groups formed by the Ministry of Education and composed of scholars and specialists invited by it. We firmly believe that in the near future technological and vocational education in Taiwan will achieve even greater accomplishment, bear more beautiful fruit, and produce more significant results.

Note

1. Ts'ai Jen-chien, K'o-chi ti pai-k'o ch'uan-shu: T'ien-kung k'ai-wu,(Taipei: Shih-pao chu-pan shih-yeh, 1985), pp. 6-8.

2. Wei Cheng-tao, Chung-kuo Szu-hsiang shih, (Taipei: Ta-lin ch'u-pan she, 1985), pp. 122-125.

3. Charles A. Bennett, History of Manual and Industrial Education Up to 1987, (Chas. A. Bennet Company, Inc., 1926), pp. 13-14.

4. Joseph Needham, Science and Civilization in China, (Taiwan Shang-wu Publishing Company, 1972)

5. Ts'ai Jen-chien, p.18.

6. Ibid., p.37.

7. Ibid., pp.14-18.

8. Ibid., pp.12-4.

9. Ibid., pp.16-7.

10. Ibid., p.18.

11. Ibid., p.6.

12. Ibid., pp.6-8.

13. Hsu Tzung-lin, "Chuan-k'o hsueh-hsiao mu-piao yu kuag-neng, Chuan-k'o hsueh-hsiao chiao-shih shou-ts'e", (Department of Technological and Vocational Education, 1987), pp.3-5.